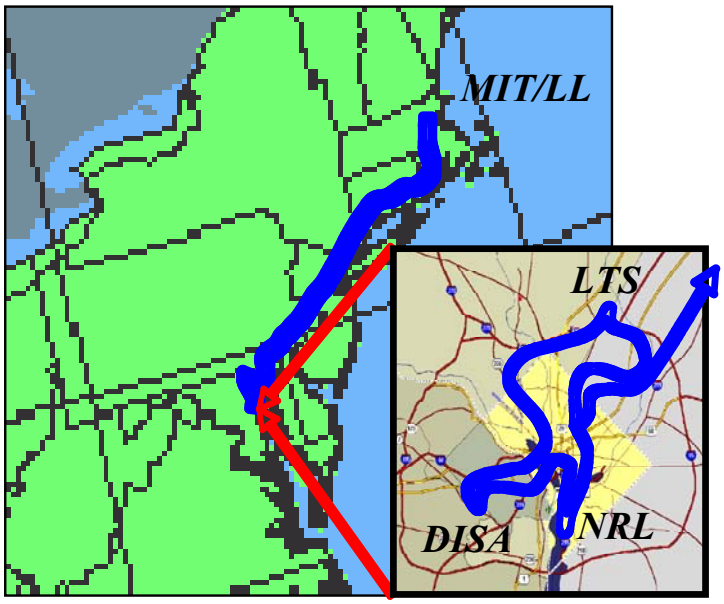
Optical Networking



A major feature of the GIG-EF is an all-optical network substrate surrounding the Washington, DC, area and extending to Boston, MA, supporting dynamic wavelengths at 10 Gbps and beyond

The Global Information Grid Evaluation Facilities program (GIG-EF) supports a network test environment that interconnects architects, developers, users, and testers of the DoD Global Information Grid (GIG) transformational communications vision. The Naval Research Laboratory is the lead developer of the GIG-EF and is supported by SPAWAR Systems Center – San Diego. Key stakeholders and testbed participants include MIT Lincoln Laboratory, Defense Information Systems Agency, Joint Interoperability Test Center, the Joint Tactical Radio System Program Office, the Intelligence Community, NASA, and others from industry and academia. An important feature of the GIG-EF is an 800 km all-optical network between MIT/LL in Boston and the Washington area ATDnet community. A recent demonstration extended this network to the ACM/IEEE Supercomputing 2004 Conference *(a ~1200 km path from Boston to Washington to Pittsburgh)*. NRL employed two 10-Gbps wavelengths driven at full rate by extension of the high-performance (4x) InfiniBand protocol across this entire network to demonstrate scalable virtual data storage and access to Petabytes of information for SC2004 participants. The optical network control plane uses the Generalized MultiProtocol Label Switching (GMPLS) protocol. The GIG-EF substrate peers with the NSF Dragon optical network and provides the flexibility needed to research the Just-in-Time (JIT) protocol within the ATDNet infrastructure for dynamic network response.

BENEFITS:

- All-optical RDT&E environment *(with no electronic constraints)* for investigating any electronic or optical modulation, signaling, network stack or protocol design
- Scalable, end-to-end, net-centric test environment for "stress-testing" and experimentation without impacting operational networks
- A heretofore unavailable capability to emulate link characteristics and characterize flows end-to-end; to accurately measure the effects of latency, bit error rates, and intermittent connectivity for GIG net-operations over wireless, mobile, fixed or overhead assets.

APPLICATIONS:

- IPv6, MPLS, E2E Quality of Service, routing, and HAIPE testing in near-term and future GIG architectures
- Support net management in exercises by emulating up to 100,000s users and 1000s sensors

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